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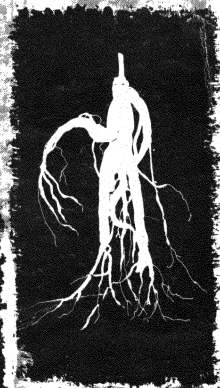
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GROWING GINSENG

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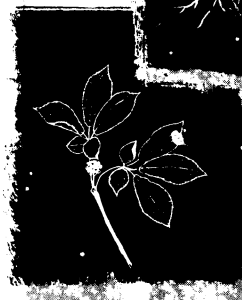
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GROWING GINSENG

By LLEWELYN WILLIAMS, *Crops Research Division,
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American ginseng¹ is a fleshy-rooted herb native to cool and shady hardwood forests from Quebec and Manitoba south to northern Florida, Alabama, Louisiana, and Arkansas. Wild ginseng has been harvested for many years and is cultivated commercially for its root, both in its natural range and in the Pacific Northwest.

American ginseng shows variations in characteristics, particularly in the roots. Western types usually have long, thin roots of undesirable qualities. Plants from the northern part of the country, particularly Wisconsin and New York, are the most desirable for export, furnishing roots of good size, weight, and shape, and are generally considered the best breeding stock. Cultivated roots usually are heavier and more uniform than wild roots, although they command a lower price in the market.

Ginseng is valued by some Chinese and Koreans, who believe the dried roots have stimulant properties.

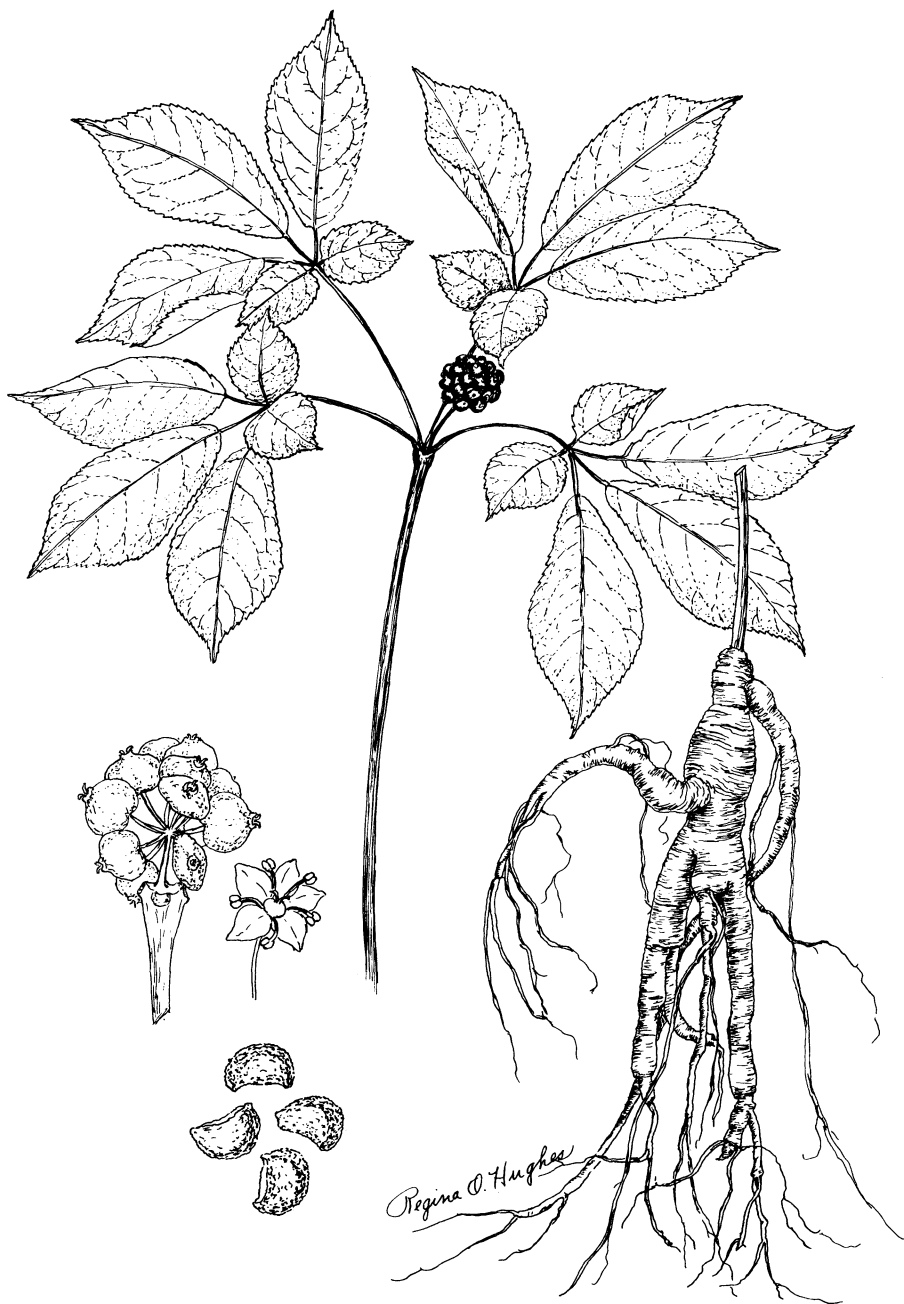
(There is, however, no scientific evidence to support that belief.) The market value of the cured root is based on color, maturity, size, and form.

DESCRIPTION

Ginseng grows about 1 foot tall. Leaves of mature plants usually consist of five ovate leaflets. It blooms in midsummer; the flowers are greenish yellow, borne in clusters. The fruit is a bright crimson berry, containing one to three wrinkled seeds the size of small peas. Mature root is spindle shaped, 2 to 4 inches long, and up to 1 inch thick. In plants upwards of 5 years old, the root is usually forked, with prominent circular wrinkles. Roots reach marketable size when 5 to 7 years old. They are dug, carefully washed to remove adhering soil, and dried. Only whole roots are acceptable in the trade.

Best quality root of proper age breaks with a somewhat soft and waxy fracture. Young or undersized roots dry hard and glassy and are less marketable.

¹ *Panax quinquefolius* L.



Branch, root, flower, berries, and seeds of American ginseng.

PLANT MATERIALS

Ginseng is grown from seeds, seedlings, or roots. Plants free from blight or mildew and growing spontaneously in woodland may be transplanted to prepared beds.

Ginseng requires 5 to 7 years to mature from seed. By planting separate beds of seeds, 1-, 2-, and 3-year-old seedlings, and roots, the first crop can be scheduled in 3 or 4 years after planting. Each year after the first harvest, another crop will come to maturity.

Seeds

Plant seeds in the spring, as soon as the soil can be tilled. Only scarified or partially germinated seeds should be used for planting. They are planted 8 inches apart each way in permanent beds, or 2 by 6 inches apart in seedbeds. Cover seeds with 1 inch of forest soil, or well-rotted hickory or basswood sawdust; do not use pine or oak sawdust.

Seeds ripen in the fall, but generally do not germinate until the following fall. Do not allow ripe seeds to dry out. Store them in a cool, moist place. Use woodland soil, sand, loam, or sawdust as a storage medium.

Use of seeds instead of seedlings may prevent the introduction of disease to new plantations. Also, this is the least expensive way to start a plantation, but requires a longer period until harvest.

Some growers plant the seeds when they ripen in September, and cover the beds with leaf mold or mulch. They keep the beds covered until spring, when the seeds begin to sprout.

Seedlings

Ginseng seedlings are more expensive than seeds, but a crop grown from seedlings can be harvested 2 or 3 years sooner than a crop propagated from seeds. Several firms sell 1-, 2-, or 3-year-old seedlings. Three-year-old seedlings produce seed during the first fall after planting, which may be used for planting future crops. Set seedlings in permanent beds, 8 inches apart each way. Closer spacing tends to increase disease in the plantation.

Roots

Roots may be set any time from October to April, after soil has been tilled. Fall planting, however, is usually preferred. Plant roots 2 inches below the bed surface, and 8 inches apart each way. When roots are not available in woodland, beginners should purchase them from reputable growers. Roots grow more rapidly when not permitted to seed.

CULTURE

Ginseng may be grown directly in woodlots or in lath sheds with partial shade—an environment similar to the plant's natural habitat. Plants thrive best in loamy soil, such as found in oak and sugar maple forests in the North. Shade is essential.

Soil

Ginseng grows naturally on slopes of ravines and in well-drained sites where soil is formed from acid leaf mold of hardwood forests. The soil

should be naturally dry and fairly light, and in condition to grow good vegetables without the addition of strong manure. By proper treatment almost any fairly good soil can be conditioned for ginseng growing. The addition of woodland soil gives best results. Very sandy soil tends to produce hard, flinty roots of inferior quality.

For seedbeds, break up soil to a depth of 6 to 8 inches, and remove all weeds, grasses, and roots. Mix 1-to-1 with fiber-free woodland soil. If the soil is inclined to be heavy, add enough sand so that mixture will not harden after heavy rain.

Beds

Selection of proper location, preparation of soil, and good drainage are important in planting ginseng. The best site for beds is a hardwood forest, with tall trees to provide reasonably dense shade, and with little undergrowth. Similar drainage and shade conditions should be maintained when growing ginseng in lath sheds.

Make beds 4 feet wide with walkways between them. For root planting, work the beds up to 12 inches deep. For seeds and seedlings, work the beds only 8 inches or so



A lath shed provides shade for growing ginseng.

2015-D

deep to prevent settling. Mound the center of permanent planting beds to provide space for more plants and, if located on flat ground, to facilitate good runoff of water. Slope the walkways so that they will drain water from the beds during heavy rains.

Shade

Ginseng needs three-fourths shade during the summer, and free circulation of air. The proper amount of shade can be provided in lath sheds or by trees in a forest planting. Laths should run north to south to provide alternating sun and shade to the plants. Do not use burlap or muslin; they interfere with air circulation.

Cultivation

Ginseng requires relatively little cultivation. The beds should be kept free of grass and weeds, and the soil should be scratched with a light implement whenever it shows signs of caking. One active man can easily take care of about 2 acres of ginseng.

Mulching

A winter mulch over the crowns is essential to prevent heaving by frost. A 4- or 5-inch layer is ample in the most severe climate; less is needed in the South. Spread mulch when frost is imminent, and remove it in the spring before the first shoots appear. Light mulching to retain moisture during dry weather is also advisable.

Forest leaves or light brush, held in place with poultry netting, makes

the best mulch. Cornstalks stripped of husks, bean vines, cowpea hay, and buckwheat straw are also suitable if they do not contain weeds, seeds, or other materials attractive to rodents.

Fertilizer

Many growers are opposed to excessive use of fertilizers. Heavy use of barnyard and chemical fertilizers lessens the resemblance of cultivated ginseng to the wild root. Overmanuring also forces growth and lowers the resistance of ginseng to the attacks of disease.

Some growers fertilize with leaves or old sawdust of hardwood trees, or with ground-up, rotted hardwood. Others prefer woodland soil or rotted leaves 4 to 6 inches deep, spaded to a depth of about 8 inches, with fine raw bonemeal well worked in, and applied at the rate of 1 pound per square yard.

Protection

Fence beds to keep out animals and to discourage theft. Protect the beds from moles with boards or close mesh wire netting set 12 to 18 inches in the ground. Rodents may be controlled with traps.

DISEASES

Cultivated ginseng is susceptible to a number of diseases, some of them severe. Their development appears to be caused by overcrowding, lack of proper ventilation, and excess moisture in the soil. Errors in fertilizing and soil treatment may also lower resistance to diseases.

The principal diseases that attack

ginseng, their symptoms, and recommended control are as follows:

Alternaria Blight and Root-Rot

Alternaria blight and root-rot are caused by a fungus, *Alternaria panax*. Dark-brown spots appear in the spring as a minute, mold-like growth on the stems just above the surface of the ground. Later, large spots appear on the leaves, and gradually the leaflet may droop at the point of attachment to the stalk. Affected roots rot very slowly. Fruit heads also are often attacked, and as a result the seeds are shed. In severe cases practically every plant in the bed may become blighted.

One method of control is to remove and destroy diseased tops. Another method is to spray 2 or 3 times during the growing season with bordeaux mixture (3 pounds of copper sulfate, 3 pounds of spray or hydrated lime, and 50 gallons of water). Organic compounds have been shown to be more effective than copper and are coming into general use. Maneb and zineb appear to be the most promising compounds available.

Phytophthora Mildew and Root-Rot

Phytophthora mildew and root-rot are caused by *Phytophthora cactorum*. This widespread fungus is destructive on leaves, stems, and roots of plants of all ages.

The leaflets wilt and droop at the tip of petiole, and the stems become discolored and hollow. The leaf center becomes white, and attacked

roots show a semisoft rot. The plants should be sprayed in early spring with bordeaux mixture (3 pounds of copper sulfate, 3 pounds of ground lime stone, and 50 gallons of water). The affected roots should be destroyed and the soil disinfected with formaldehyde (1 part to 50 parts of water), or with copper sulfate (1 pound to 5 gallons of water), applied at a rate of about 1 gallon per square foot.

Verticillium Wilt

Verticillium wilt is a disease of older ginseng plants, caused by a fungus (*Verticillium albo-atrum*) that produces minute spores on the roots. At first, the top wilts and dies; gradually the roots are affected. Diseased roots should be dug and dried to remove source of infection. The soil should be treated with formaldehyde or steam.

Thielaviopsis Root-Rot

Thielaviopsis root-rot affects plants of all ages, being most common in seedling beds. The disease is caused by a fungus, *Thielaviopsis basicola*, and is most prevalent when the soil is alkaline. Grayish-black spots appear on the surface of roots. Where ginseng grows in natural forest the soil is acid; the soil of the ginseng garden should also have an acid reaction. The soil can be made acid by applying acid phosphate at the rate of 1,000 to 2,000 pounds per acre, the amount depending on the alkaline condition of soil. Lime, ashes, or other alkaline fertilizers should not be applied to ginseng beds. Before being sown to seed, infected beds should be treated with formaldehyde or steam.

PRECAUTIONS

Chemicals used as fungicides are injurious to man or animals if taken internally; some are very poisonous. Handle them with care. Read the container label carefully. Follow all directions and heed all precautions for storing, mixing, applying, and disposing of fungicides.

White-Rot and Black-Rot

Sclerotinia white-rot and black-rot are caused, respectively, by two species of fungi—*Sclerotinia sclerotiorum* and *S. smilacina*. White-rot occurs in most sections where ginseng is grown, but rarely causes widespread damage. The disease affects the roots and the stem but does not spot the foliage. Diseased stems lose their green color and become hollow. Infected roots rot rapidly; the tissue becomes soft and brittle. Hard, black bodies, which harbor the fungus, form on the outside of the roots and within the stem.

Black-rot attacks the roots only. Its presence is indicated by the failure of the plants to develop in the spring. When the roots are dug, they are mummylike in appearance.

With both white- and black-rot, good drainage and aeration help to prevent losses. Infected plants should be dug up and burned. The soil should be treated with a solution of formaldehyde (1 part to 50 parts of water) or with copper sulfate (1 pound in 10 gallons of water).

Ramularia Root-Rot

Ramularia root-rot, or “rust,” due to a fungus (*Ramularia* sp.), is commonest on seedlings. On older

roots, spots are rusty brown but do not penetrate deeply. In seedlings, the infected taproot becomes short and knoblike, and the fine rootlets are damaged. The disease is favored by an alkaline soil; the use of lime or wood ashes should be avoided.

Damping-Off

Damping-off of seedlings is characterized by the decay of the stem at the surface of the soil. It results in the plants falling over and dying. The disease is caused by a number of fungi commonly present in soil with excessive moisture and lack of aeration. Good drainage is essential in raising seedlings. A layer of sand, $\frac{1}{4}$ to $\frac{1}{2}$ inch thick, sprinkled on the surface of the bed sometimes helps check damping-off. So does sterilizing seedbeds with formaldehyde (1 part in 100 of water), before planting. Steaming the soil is also effective.

Papery Leaf-Spot

Papery leaf-spot is common during dry periods. It is characterized by spots between the veins or along the margin of the leaves and is caused by an insufficient supply of water. Large roots of nearby trees exhaust the water supply, and insufficient shade causes rapid drying out of moisture.

To control papery leaf-spot, install tile drainage, which will equalize moisture and protect the plants during the dry season. The beds should not be made near large trees. Plants kept in a healthy condition will have a large number of feeding roots for absorption of water.

Root Knot

Root knot, common on wild and cultivated ginseng plants, is caused by a nematode or eelworm, *Meloidogyne*, forming galls or swellings on underground parts of the plant. Nematodes destroy ginseng seedlings and reduce the market value of mature roots. Ginseng plantings should be started in nematode-free soil, using healthy roots or seeds that have not been in contact with infested soil. Drainage from an infested site must not flow onto new beds. Implements must be cleaned and thoroughly dried so as not to introduce any contaminated soils into uncontaminated beds.

HARVEST

A ginseng crop matures in 5 to 7 years. Generally the roots are dug in mid-October of the sixth or seventh year. Good roots are about 4 inches long, 1 inch thick below the crown, and average 1 ounce in the fresh state. Older roots possess the most substance and when properly cured bring the highest prices.

Digging

Dig the roots with their forks intact. Carefully free them of adhering soil so as to preserve their natural color and characteristic circular markings. Do not scrape or scrub them. The market value of the product is based, in part, on wholeness and appearance.

Some growers replant young and undersized roots, or heel them in until spring planting.

Drying

Dry the roots in a well-ventilated, heated room. Drying is usually

started between 60° and 80° F., and after a few days the temperature is increased to 90°.

Another method, adopted by some growers, is to start drying between 100° and 110°, and when roots wilt lower the temperature to 90°.

Spread the roots thinly on lattice or wire-netting shelves. Turn them frequently, but handle with care to avoid marring the surface or breaking the forks.

Roots more than 2 inches in diameter will need to be dried for about 6 weeks; smaller roots may be properly dried in less time.

Throughout the curing process, especially during damp weather, care should be taken to see that the root does not mold or sour. Do not overheat, as it tends to discolor the surface and spoil the texture of the root.

When well cured, the roots should be stored in a dry, airy, rodentproof place until ready for market.

Yield

The yield of cultivated ginseng depends on the condition under which the crop is grown, and the experience and skill of the grower. The estimated weight of dried 6-year-old root from a bed 4 by 16 feet is 10 pounds. Yields of dried roots from a well-managed planting should average about 1 ton per acre, although greater yields are often reported. Crops from forest plantings are reported to be about half those obtained in lath sheds, but production costs are also much less.

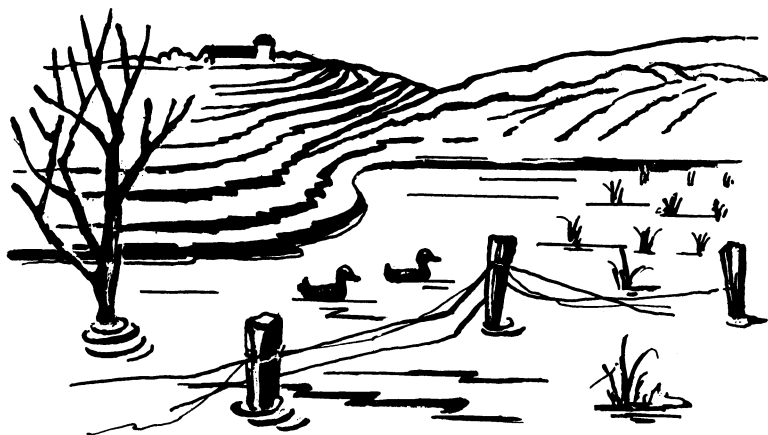
The value of the crop depends on the market at time of harvesting. There are several firms in the United States which buy ginseng.

The market for ginseng root is limited. An estimated 95 percent of the ginseng collected or grown in the United States is exported to the Orient. During the 3-year period 1960 through 1962 such exports averaged only 151,000 pounds of dried root per year.

While the prices paid for ginseng are high, they fluctuate greatly. During the same 3-year period price-per-pound averages were \$18.28, \$17.69, and \$17.55.

High initial cost of planting stock, susceptibility to diseases, long maturing period, and a limited market indicate ginseng farming should be approached conservatively. Since yields of dried root average about 1 ton per acre, 100 to 200 acres of mature ginseng could easily supply the total market for 1 year.

Each year the U.S. Department of Agriculture receives thousands of requests for information on growing ginseng. In an effort to comply with these requests, the Department has prepared this Farmers' Bulletin.



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